PREVALENCE, USE, AND PERCEPTIONS OF STUDENT FARMS AT PUBLIC AGRICULTURAL UNIVERSITIES

By

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Abstract:

Student farms provide experiential learning opportunities at a variety of colleges and universities across the United States. The full extent of the student farm movement at public agricultural universities, [Land Grant Universities (LGUs) and Non-land-grant Agriculture and Renewable Resources Universities (NARRUs)] is largely unknown. An online survey was sent to 112 LGUs and 69 NARRUs to examine the prevalence, use, and perceptions of student farms at these institutions. Seventy-five of the 181 (41.4%) institutions responded to the survey, 47 (62.67%) institutions had student farms and 28 (37.33%) did not have student farms. Institutions with student farms show that students are largely self-motivated to participate in farm work, but major differences exist between student farms at 1862 LGUs and NARRUs. Overall, student farms help institutions accomplish the LGU/university mission. Institutions without student farms indicated that finances and student interest are barriers to student farm establishment; however, they believe student farms would help them accomplish the LGU/university mission. Future research can develop greater means for communication/information sharing among student farms, work to reduce barriers to student farm establishment, and further clarify the differences between student farms at 1862 LGUs and NARRUs.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER I

LITERATURE REVIEW

Introduction[z]

Over the last 30 years, an agricultural education phenomenon has begun to emerge at institutions of higher education across the United States (Parr and Trexler, 2011). Student farms are innovatively revolutionizing student learning experiences at a variety of colleges and universities (Sayre, 2011). These institutions include, but are not limited to, land grant, liberal arts, public admission, and private colleges and universities. Students of all majors and higher education institutions of all sizes are participating in experiential learning opportunities at student farms. If the increased establishment of student farms continues, the future of student farms at American colleges and universities looks bright (Leis et al., 2011). However, the role that student farms play at the majority of public agricultural universities, the primary sources responsible for promulgating agricultural education to the public, is still largely undefined. This research focuses specifically on members of the Academic Programs Section (APS) ("What is APS?," n.d.) of the Association of Public and Land Grant Universities (APLU) including 1862, 1890, and 1994 Land Grant Universities (LGU) and Non-land-grant Agriculture and Renewable

[z] Written in the style of NACTA (North American Colleges and Teachers of Agriculture) Journal

Resources Universities (NARRU) ("Non-land-grant Agriculture and," n.d.).

Early Student Farms

Student farms are not a new innovation. Rather, student farms have existed in a variety of forms and for a variety of purposes since the late 1800s. The early days of student farms looked very different than the current student farm movement at institutions of higher education. Originally, work colleges such as Berea College, College of the Ozarks, and Warren Wilson College incorporated on-campus farms as part of students' room and board package (Sayre et al., 2011). Many of these students hailed from rural areas where farm work was part of their everyday lives whether at college or at home. These colleges offered opportunities for rural youth to learn valuable job skills through agriculture and related disciplines while being educated. The work-study programs at many of these colleges are ongoing; however, in some cases, the student demographics have changed dramatically. In many cases, agricultural and vocational education has been traded for liberal arts education. Rather than educating impoverished, rural students who otherwise would not have educational opportunities, many of these small private colleges now attract students from all over the nation and world. While the campus farms at these types of universities still persist, in most cases, participation is optional. Current students now are motivated by opportunities to gain new experiences within agriculture, a topic previously unfamiliar to most. Rather than focusing on yield and production, these student farms seek to impart an appreciation for agriculture, the role of environmental stewardship, and in the case of Sterling College's draft horse program, a reminder of simpler times (Shipley, 2011). While many of the work college models continued into the

1900s and some even today, the landscape of agricultural education in the United States changed dramatically with the advent of LGUs.

Public Agricultural Universities

During the late 1800s and early 1900s, the LGU concept was evolving and rapidly growing and changing to meet the needs of American society (Bonnen, 1998). Land Grant Universities were a solution to providing professionals for an increasingly industrialized nation, educating the general public, and helping the middle-class achieve the "American Dream." Three major pieces of legislation are responsible for the continued support and development of LGUs. These include the Morrill Act of 1862, the Hatch Act of 1887, and the Smith-Lever Act of 1914. These laws correspond with today's LGU mission of teaching, research, and Extension. The Morrill Act provided land and funds for the establishment of a university in every state of the nation, also known as "1862 LGUs" (Table 1) ("Morrill Act," 1862). The primary focus for these institutions was to make education accessible on practical matters such as agriculture, home economics, mechanical arts, and military training accessible to everyday people (Herren and Edwards, 2002). The next piece of LGU-related legislation passed was the Hatch Act, which enabled the establishment of research facilities and agricultural experiment stations at LGUs ("Hatch Act," 1887). This was in response to the burgeoning LGUs long-term needs of scientific improvement so American agriculture as a whole could be improved rather than only meeting immediate local needs (Ferleger, 1990). Finally, the Smith-Lever Act instituted the start of the Cooperative Extension Service, which provides public service through outreach to citizens of each state ("Smith-Lever

Act," 1914). Outreach, also known as Extension, is the conveying of knowledge from the university and researchers to the stakeholders and society as a whole (Bonnen, 1998). The LGU concept, specifically, public engagement through Extension are unique American contributions to worldwide higher education (Bonnen, 1998; McDowell, 2003).

The passage of the Morrill Act of 1890 expanded the number of LGUs by allowing for the creation of "1890 LGUs," which created opportunities for African American communities to obtain the same resources provided by 1862 LGUs ("Second Morrill Act," 1890). Today, there are 19 1890 LGUs representing 18 states (Table 2) ("Land grant university," n.d.). From early on, these institutionally diverse 1890 LGUs were known for their emphasis on teaching and teacher training (Harris and Worthen, 2004). In the 1950s, available funding for 1890 LGUs greatly increased thus enabling more research to occur at these institutions (Comer et al., 2006). These universities have provided important resources to millions of people despite funding challenges and the delayed establishment of research and Extension programs.

In 1994, legislation signed by President Clinton incorporated 29 Native American tribal colleges into the LGU system ("Equity in Educational," 1994; Jaschik, 1994). These "1994 LGUs" offer relevant educational programs and opportunities to affiliated tribes, many of which would have limited higher education options otherwise (Halvorson, 2016). Currently there are 34 1994 LGUs (Table 3) representing Native American tribes from thirteen states ("1994 land grant," 2017). The cultural diversity these universities

offer can greatly enhance partnerships with other universities; however, in the past these universities have experienced difficulties related to funding and collaboration with other LGUs, especially 1862 LGUs (Halvorson, 2016; Phillips, 2003). 1994 LGUs are unique additions to the American LGU System and provide essential resources to many tribal communities throughout the United States.

As a whole, the current LGUs are very different from the originals established in the mid-nineteenth century. The primary mission of LGUs is still to educate students, conduct research, and extend knowledge to the general public. Prior to their development, LGUs were a unique concept. These universities have positively impacted countless citizens and made American agriculture the wonder that it is today (Herren and Edwards, 2002).

While LGUs are possibly the most well-known institutions providing degrees in agricultural and related majors, LGUs are not the only public universities who fill this role. Non-land-grant Agriculture and Renewable Resources Universities (NARRU) are a group of 69 public colleges and universities (Table 4) offering baccalaureate degrees in fields related to agriculture and renewable resources ("Non-land-grant Agriculture and," n.d.). Annually, more than 50,000 students are provided quality educational experiences through the hands-on opportunities in these academic programs. Collectively, NARRUs account for approximately 45% of the agricultural and related undergraduate degrees awarded at post-secondary institutions in the United States ("Non-land-grant Agriculture and," n.d.).

The Student Farm Movement

Major changes in American agriculture during the 20th century had a tremendous effect on laying the social groundwork for the student farm movement to happen. In the early 1900s, as LGUs increased scientific inquiry into agriculture and disseminated new information to producers, agriculture became increasingly standardized and able to take advantage of growing urban markets (Lyson, 2004). Improvements in refrigeration and innovations from World War II allowed American agriculture to grow tremendously in mechanization and efficiency. During the 1970s, concern about the environmental impact of agriculture led to increased interest in sustainable agricultural practices, food safety, fresh food, and farmers' markets (Gillespie et al., 2007; Parr and Van Horn, 2006). An important aspect of both public and LGUs is their relevancy to their regions or states (Byrne, 2016). Therefore, as universities responded to the demands of students and communities, there was a trend toward increased student farms at universities across America. Responding to students' needs for gaining hands-on opportunities in alternative agriculture systems, one of the first institutions to establish a student farm during this time period was the University of California, Davis (UC Davis), an LGU (Parr and Van Horn, 2006). Also during this time, some non-LGU institutions were also beginning student farms. Some of the most notable ones include an urban farm based out of the Department of Landscape Architecture at the University of Oregon and a multi-disciplinary experimental agriculture and liberal arts program at Hampshire College (Sayre et al., 2011). These three programs are icons of students' increased level of environmental awareness and desire for more innovative agricultural education experiences during the 1970s.

The 1980s were a time of great change in American agriculture. Biotechnology was on the rise; however, some parts of the country such as upstate New York were moving from models of large-scale monoculture back to more diversified, sustainable agricultural production models (Lyson, 2004). Student farm establishment was scant during this decade with evidence of only four student farms being started. However, many of the previously established student farms continued to grow and develop. During this time, the Student Environmental Farm at UC Davis was fully functioning and engaging students and the public through education, research, and Extension on their farm facilities strengthening their commitment to sustainable agricultural education (Parr and Van Horn, 2006).

In the 1990s, both student farms and farmers' markets began increasing yet again (Martinez et al., 2010; Sayre et al., 2011). Growth in local and sustainable foods marked the beginning of a larger movement toward civic engagement in agriculture (Lyson, 2004). Changes over the last century such as increased agricultural productivity and technological advances in refrigeration and transportation have revolutionized our food system by favoring the development of large commercial farms, distribution networks, massive supermarket chains, and availability of fresh produce year-round, as just a few examples (Heard and Miller, 2016). These improvements have greatly increased our ability to produce abundant and safe food but have also demonstrated deficiencies in environmental care, human nutrition, availability of fresh food, indigenous knowledge of food production, social relationships between producers and consumers, and the effects

of a faster-paced, less-connected lifestyle (Santa Cruz, 2015). Education and cultivation are essential keys to increased food literacy and revitalization of our food system. This renewed social connection to local food systems is at least part of the reason for the increase in student farms during the 1990s and 2000s. Twenty-two student farms were established in the 1990s (Sayre et al., 2011). Of these, nine were at LGUs. The following decade was similar with 23 farms established; however, the number of new student farms at LGUs slightly increased to 13. Through the increased growth, these LGUs showed evidence of using student farms to further participation in the Land Grant mission. Cornercopia, the University of Minnesota's Student Organic Farm was providing opportunities for students to gain hands-on experience growing vegetables, while also managing individual research projects (Ashling et al., 2007). With financial assistance from grants, Michigan State University's student farm was able to provide outreach to school programs, agricultural producers, and non-horticulture students at the university, while also conducting considerable research projects utilizing the student farm facilities (Biernbaum et al., 2006). Students working at the Utah State University Student Organic Farm were engaging the public through social media, an annual U-Pick community pumpkin patch fundraiser, and regular interactions with community supported agriculture (CSA) program customers (Reeve et al., 2014). These are just a few of the most obvious examples from academic literature of student farm participation at LGUs.

Fields of Learning (Sayre et al., 2011) includes student farm establishment stories from four LGUs; however, much of the publicity on the topic of student farms is about student farms at non-land-grant colleges and universities, many which do not offer degrees in

agriculture. Even though some non-agricultural universities are providing opportunities for students to gain hands-on experience in small-scale farming, much of this narrative has centered on LGUs as the main and traditional source of agricultural education; however, because of the prevalence of NARRUs as agricultural higher education institutions, these universities are an important part of this discussion. Based on the annually changing NARRU membership list and the list of student farms in Fields of Learning (Sayre et al., 2011), several NARRUs appear to have student farms, though these universities also seem less represented in academic literature than other types of university student farms such as those at LGUs (Ashling et al., 2007; Biernbaum et al., 2006; Reeve et al., 2014) and liberal arts colleges (Bacigalupi, 2013; Gardner, 2012; Sayre et al., 2011). However, NARRUs are not completely absent in literature as illustrated by an article by Duram and Williams (2015) detailing the past, present, and expected future of Southern Illinois University, Carbondale's LOGIC student farm.

Student Farm Definitions

Among previously published literature, many different terms exist to describe student farms. These include, but are not limited to institutional learning farm, college farm, campus farm, student organic farm, and student educational farm (Sayre, 2011). With such a wide array of student farm models at such diverse institutions, unsurprisingly, many different definitions of "student farm" also exist. While, some primary and secondary schools have school farms and gardens, this research is focused solely on post-secondary higher education institutions.

Fields of Learning (Sayre, 2011) is the most comprehensive resource on student farms published to date. The introductory chapter of this book ascertains certain qualifications for an agricultural enterprise at a tertiary, accredited, and degree-granting institution to be considered a student farm. These essential, yet loosely-defined, qualifications include: "The farm must include the possibility for student initiative or leadership in some capacity," and "The farm must have a degree of focus on environmental sustainability or stewardship" (Sayre, 2011).

This book also outlines some common educational principles among student farms in the United States. These principles include: "Manual skills in addition to academics should be developed by all students", "Relationships and non-academic activities give strength to campus communities", and "Working on a farm adds depth to students' perspectives on ecology, economics, and sociology" (Sayre, 2011).

Holzhueter (2006) used the following definition to describe the student market garden at the Macoskey Center for Sustainable Systems Education and Research at Slippery Rock University in Pennsylvania: "… puts students to work in ways that teach them about crop production as well as direct marketing. All work—from planning to harvesting—is done by students. The farm demonstrates basic plant and animal husbandry, professional cultivation methods, integrated pest management and research." Leis et al. (2011) used the same definition to identify potential institutions to participate in a nationwide survey of student farm managers.

In a focus group study of experiential learning at student farms, Parr and Trexler (2011) defined student farms as: "… campus educational facilities that provide hands-on opportunities for students to engage in horticulture, agriculture, and marketing at relatively small scales of production and distribution. Production is often organic and diversified, including vegetables, fruits, and small livestock, on from 2 to 10 hectares (5-25 acres). Marketing is often direct, including Community Supported Agriculture (CSA) subscription schemes, campus farm stands, and sales to campus dinning [sic] services."

While some outsiders may equate student farms with the more expansive agricultural experiment stations found at LGUs and many NARRUs, in most cases student farms and agricultural experiment stations are quite different. The fact that some LGUs possess both a student farm and agricultural experiment station research farms, indicates that these types of farms are not one and the same (Sayre, 2004) although many student farms are used for research. While land grant universities, by nature and mission, play an important role in educating students in agriculture, the educational value filled by student farms is different than traditional educations at LGUs (Sayre, 2011) even though some land grant universities have student farms. While agricultural research and production are common on both types of farms, student farms generally serve more of a social role in the community than do research farms. Student farms have the potential to foster community involvement, innovative research, multidisciplinary collaboration, and enriched agriculture education through a variety of university and community partnerships (Ratasky et al., 2015) in ways that traditional research units often do not. Student farms have been found to be "gathering places" for teaching agriculture while bringing together

interdisciplinary teams of faculty, staff, and students to provide agricultural education resources for communities (Markhart, 2006). Sayre (2011) names three common traits among most student farms:

- Students of all majors can participate
- Relatively small in scale
- Emphasize hands-on experience in production and marketing

These student farm definitions include many nuances and caveats making maximum clarity for this study an essential aspect. Therefore, a combination of the above definitions to define "student farm" were used: Student farms are "campus educational facilities that provide hands-on opportunities for students to engage in horticulture, agriculture, and marketing at relatively small scales of production and distribution" (Parr and Trexler, 2011). Student farms are different from experiment station research facilities because of the high level of student labor, leadership, and initiative (Sayre, 2011) provided during planning, production, harvesting, and marketing (Holzhueter, 2006). A student farm may be located on experiment station land but must be operated as a separate entity.

Sustainable Agriculture and Student Farms

As reflected in Fields of Learning's (Sayre, 2011) student farm definition and the previously stated reason for the growth of the student farm movement nationwide, sustainable agriculture plays a large role in many student farms. A study conducted by Leis et al. (2011) found that most student farms use organic/sustainable agriculture

practices, an area in which many LGUs have been criticized for lack of participation. In fact, teaching sustainable and organic agricultural practices have been shown in other publications as major reasons for the development of particular student farms and the student farm movement in general. This varied and multidisciplinary side of student farms offers diverse faculty involvement and valuable educational opportunities in an appealing learning environment for a wide range of student interests (Biernbaum et al., 2006; Leis et al., 2011; Markhart, 2006). Student farms using varied production practices (organic and conventional) maximize learning opportunities for students because of the ability to compare and contrast while learning both systems. Some practitioners maintain that students should experience a variety of production practices and farm sizes in order to best understand the whole agri-food system (Trexler et al., 2006).

The 2012 Organic Land Grant Assessment measured the commitment to organic production of each 1862 LGU ("2012 Organic Land," 2012). Concerning student farm participation, this study found that the number of student organic farms at LGUs rose from nine in 2003 to 36 in 2011. Six of the LGUs received the highest possible score on the assessment thus indicating that these institutions met the criteria for having a student organic farm in addition to other benchmarks for organic participation. The study found that participating in research on certified organic crops or setting aside land for a student organic farm is now normal for the majority of LGUs; however, the web article fails to provide quantitative data to itemize participation in the two categories or support the claim.

The Organic Farming Research Foundation (OFRF) first began assessing LGUs to determine the level of participation of each institution in providing relevant information to the organic farming industry ("2012 Organic Land," 2012). In the eight years leading up to the 2012 LGU Organic Assessment, LGU participation in training farmers for organic production greatly improved. This study claims that LGUs utilizing a formal curriculum, student farm, and training in marketing and distribution prepare the most students to be well trained organic producers. However, public universities, including LGUs, are increasingly being encouraged to play a larger role in developing and promoting sustainable agriculture (Parr and Van Horn, 2006). So, it seems that the success student farms have had in this area could be a major way that public agricultural universities meet these demands for sustainable agriculture education. Again as demonstrated throughout history, American public higher education is a leader in meeting societal needs through outreach and service (Byrne, 2016).

According to Parr and Trexler (2011), "Student farms are valuable models for further study because of their instructional emphasis on student centered, context-rich, and socially-dynamic learning. These approaches to pedagogy have met students' desires for alternative and meaningful learning and can uniquely contribute to LGUs need to address deficiencies in existing curricula." Already at multiple LGUs, student farm development has shown to be initiated by students, frequently those interested in non-conventional production methods, as a way of gaining hands-on experience (Biernbaum et al., 2006; Parr and Van Horn, 2006). These initiatives have shown to sometimes lead to the development of curriculum, certificate programs, and degree programs which go hand-in-

hand with the farms' sustainability focuses. While Michigan State University's Student Organic Farm (SOF) originated as a solution to student requests for hands-on organic farming experiences, it has since greatly contributed to the university's research, Extension, and community service efforts (Biernbaum, 2011).

Student farms are especially important for plant science disciplines, and more specifically departments of horticulture. Enrollment in departments of horticulture, agronomy, and related food production majors have been decreasing (Markhart, 2006). These decreases have led to departments being consolidated and courses taught on a rotating year basis or done away with altogether. While funding for student farms is difficult to find in departments that are already shrinking and experiencing budget cuts, student farms have been shown to be a tool to increase enrollment and attract more students. In a personal conversation with the horticulture department head at a large 1862 LGU in the Southern United States, the department head emphasized that while participation in their student farm did not necessarily cause many students to change majors, their enrollment in horticulture classes increased as non-horticulture students added minors in horticulture to their degree programs (personal communication, February 3, 2017). The continued development of student farms and sustainable agriculture emphases can also increase student diversity within horticulture departments (Parr and Van Horn, 2006). As public awareness and interest in sustainable agriculture and more specifically vegetable production increases, the role of student farms in educating the next generation of farmers will become increasingly important. Without adequate university support to overcome

funding and related challenges, the true potential of student farms will never be fully known (Ratasky et al., 2015).

Goals and Objectives

Considering the growth of the student farm movement over recent years, the limited academic research on the topic is a barrier to further expansion and improvement within this area (Leis et al., 2011; Parr and Trexler, 2011). Momentum from the student farm movement is demanding deeper examination of existing student farms. Calls for reform and renewed relevancy of LGUs are ever-present realities thus increasing the importance to fully know the impact that student farms have at public agricultural universities. The main motivations for this study were to further the nationwide discussion of student farms, encourage innovative ways for public agricultural universities to better prepare students for careers in agriculture, and to help public agricultural universities to be more successful in education, research, and Extension/outreach.

The goal of this survey is to determine the prevalence, characteristics of use, and perceived barriers to student farms at public agricultural universities in the United States.

The objectives of this survey were to:

- create a list indicating the presence or absence of a student farm at public agricultural universities in the United States.
- create a general map depicting public agricultural universities with and without student farms.

- identify characteristics of student farm use at public agricultural universities.
- describe perceived barriers to student farms at public agricultural universities without student farms.

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Table 1: Current 1862 Land Grant Universities.

American Samoa Community College	University of California, Riverside
Auburn University	University of Connecticut
Clemson University	University of Delaware
Colorado State University	University of Florida
College of Micronesia	University of Georgia
Cornell University	University of Guam
Iowa State University	University of Hawaii
Kansas State University	University of Idaho
Louisiana State University	University of Illinois (at Urbana-Champaign)
Michigan State University	University of Kentucky
Mississippi State University	University of Maine
Montana State University	University of Maryland, College Park
New Mexico State University	University of Massachusetts, Amherst
North Carolina State University	University of Minnesota
North Dakota State University	University of Missouri—Columbia
Northern Marianas College	University of Nebraska—Lincoln
Oklahoma State University	University of Nevada
Oregon State University	University of New Hampshire
Purdue University	University of Puerto Rico
Rutgers University	University of Tennessee
South Dakota State University	University of the District of Columbia
Texas A and M University	University of the Virgin Islands
The Ohio State University	University of Vermont
The Pennsylvania State University	University of Wisconsin—Madison
The University of Rhode Island	University of Wyoming
University of Alaska	Utah State University
University of Arizona	Virginia Polytechnic Institute and State University
University of Arkansas	
University of California, Berkeley	Washington State University
University of California, Davis	West Virginia University

Table 2: Current 1890 Land Grant Universities.

Alabama A and M University
Alcorn State University
Central State University
Delaware State University
Florida A and M University
Fort Valley State University
Kentucky State University
Langston University
Lincoln University
North Carolina A and T State University
Prairie View A and M University
South Carolina State University
Southern University and A and M College
Tennessee State University
Tuskegee University
University of Arkansas at Pine Bluff
University of Maryland Eastern Shore
Virginia State University
West Virginia State University

Table 3: Current 1994 Land Grant Universities.

Aaniiih Nakoda College
Bay Mills Community College
Blackfeet Community College
Cankdeska Cikana Community College
Chief Dull Knife College
College of Menominee Nation
College of the Muscogee Nation
Diné College
Fond du Lac Tribal and Community College
Nueta Hidatsa Sahnish College
Fort Peck Community College
Haskell Indian Nations University
Ilisagvik College
Institute of American Indian and Alaska Native Culture and Arts Development
Keweenaw Bay Ojibwa Community College
Lac Courte Oreilles Ojibwa Community College
Leech Lake Tribal College
Little Big Horn College
Little Priest Tribal College
Navajo Technical College
Nebraska Indian Community College
Northwest Indian College
Oglala Lakota College
Saginaw Chippewa Tribal College
Salish Kootenai College
Sinte Gleska University
Sisseton Wahpeton College
Sitting Bull College
Southwestern Indian Polytechnic Institute
Stone Child College
Tohono O'Odham Community College
Turtle Mountain Community College
United Tribes Technical College
White Earth Tribal and Community College

Table 4: Current Non-land-grant Agriculture and Renewable Resources Universities.

Abraham Baldwin Agricultural College	Sam Houston State University
Angelo State University	Southeast Missouri State University
Arizona State University Polytechnic Campus	Southeastern Louisiana University
Arkansas State University	Southern Arkansas University
Arkansas Tech University	Southern Illinois University, Carbondale
Austin Peay State University	Southern Utah University
California Polytechnic State University—San Luis Obispo	Southwest Minnesota State University
	State University of New York—Cobleskille
California State Polytechnic University—Pomona	State University of New York—Oswego
	Stephen F. Austin State University
California State University—Chico	Sul Ross State University
California State University—Fresno	Tarleton State University
California State University, Stanislaus	Tennessee Technological University
Cameron University	Texas A and M University—Kingsville
Chadron State University	Texas A and M University—Commerce
Dickinson State University	Texas State University—San Marcos
Eastern Kentucky University	Texas Tech University
Eastern New Mexico University	Truman State University
Fort Hays State University	University of Arkansas at Monticello
Framingham State University	University of Central Missouri
Glenville State College	University of Hawaii—Hilo
Illinois State University	University of Louisiana at Lafayette
Kent State University—Salem	University of Louisiana at Monroe
Louisiana Tech University	University of Minnesota—Crookston
McNeese State University	University of Montana Western
Michigan Technological University	University of Nebraska at Kearney
Middle Tennessee State University	University of South Florida
Missouri State University	University of Tennessee-Martin
Montana State University—Northern	University of Wisconsin—Platteville
Morehead State University	University of Wisconsin—River Falls
Morrisville State College	University of Wisconsin—Stevens Point
Murray State University	Vermont Technical College
Nicholls State University	West Texas A and M University
Northwest Missouri State University	Western Illinois University
Northwestern Oklahoma State University	Western Kentucky University
Oklahoma Panhandle State University	

CHAPTER II

PREVALENCE, USE, AND PERCEPTIONS OF STUDENT FARMS AT PUBLIC AGRICULTURAL UNIVERSITIES

Introduction

Since the early 1990s, student farms have begun to innovatively revolutionize student learning experiences at a variety of colleges and universities (Parr and Trexler, 2011; Sayre, 2011). These institutions include, but are not limited to, land grant, liberal arts, public admission, and private colleges and universities. Students of all majors and higher education institutions of all sizes are participating in experiential learning opportunities at student farms. If the current establishment trend continues, the future of student farms at American colleges and universities looks bright (Leis et al., 2011). However, the role that student farms play at the majority of public agricultural universities, the primary sources responsible for disseminating agricultural education to the public, is still largely undefined. This research focuses specifically on members of the Academic Programs Section (APS) ("What is APS?," n.d.) of the Association of Public and Land Grant Universities (APLU) including 1862, 1890, and 1994 Land Grant Universities (LGU) and Non-land-grant Agriculture and Renewable Resources Universities (NARRU) ("Non-land-grant Agriculture and," n.d.).

The first student farms in the United States were established during the late 1800s and early 1900s at work colleges such as Berea College, Warren Wilson College, and College of the Ozarks (Sayre, 2011). Students worked in agricultural enterprises on campus to compensate for college expenses. With the passage of the Morrill Act of 1862, LGUs were established making educations in agriculture, home economics, military arts, and other vocations accessible to the working class ("Morrill Act," 1862; Herren and Edwards, 2002). In 1887, new opportunities were created for uplifting American agriculture through science-based research when Congress authorized Agricultural Experiment Stations at LGUs under the Hatch Act ("Hatch Act," 1887; Ferleger, 1990). The Cooperative Extension service was established in 1914 with the passage of the Smith-Lever Act creating a means for LGUs to extend research-based information to the general public ("Smith-Lever Act," 1914). LGU influence was expanded in 1890 with the creation of "1890 LGUs" which provided opportunities for African American communities ("Second Morrill Act," 1890) and again in 1994 by incorporating Native American tribal colleges into the LGU system as "1994 LGUs" ("Equity in Educational," 1994). In addition to LGUs, NARRUs are another category of public admission agricultural institutions which contribute greatly to the number of agricultural degrees conferred annually ("Non-land-grant Agriculture and," n.d.).

Throughout the early and mid-twentieth century, LGU involvement in agriculture and technological advances stemming from World War II helped modernize American agriculture by greatly increasing productivity and mechanization (Lyson, 2004). Counter cultural movements of the 1970s brought new awareness of environmental concerns in

agriculture leading to an increase in student interest in sustainable agriculture and initiation of the current student farm movement (Parr and Van Horn, 2006). This increase caused a spike in the number of student farms at many types of colleges and universities, including LGUs, public admission, liberal arts, and private institutions (Sayre, 2011). As agricultural biotechnology expanded during the 1980s (Lyson, 2004), previously established student farms matured and establishment of new farms was limited (Parr and Van Horn, 2006; Sayre et al., 2011). However, the 1990s brought new interest in sustainable agriculture and a new age in the student farm movement. The establishment of student farms has continued to rise with at least 22 being established during the 1990s and 23 during the first decade of the 2000s.

The birth of the student farm movement in the United States has brought a variety of new research findings. Much of the student farm movement can be attributed to student interest in gaining hands-on training in sustainable agriculture (Parr and Trexler, 2011), as well as the nationwide reengagement with agricultural production and marketing, known as civic agriculture (Lyson, 2004). Student farms' interdisciplinary natures make them appealing learning environments for those interested in food systems, environmental, and production agriculture issues (Biernbaum et al., 2006). Student farms hold a special niche within experiential education where students can gain initial exposure to agriculture without over-committing (Sayre, 2004). Participation helps students develop skills in hard work, personal initiative, leadership, working together for a common goal, decision making, and communication (Reeve et al., 2014). Student farms have also been shown to foster community involvement, institutional collaboration

among a wide range of disciplines, and serve as a "gathering place" for students, faculty, and staff to gain experiential learning opportunities in agriculture (Markhart, 2006; Ratasky et al., 2015). Agricultural universities should be committed to delivering hands-on opportunities for students to experience growing and marketing crops and animals (Markhart, 2006), and further development of student farms will help increase experiential learning opportunities for students thus adding tremendous potential for agricultural knowledge and skill acquisition at universities. All of these findings have been well documented through a handful of academic publications from leading LGUs and an abundance of press from non-agricultural institutions. However, no systematic investigation has been conducted to determine the full extent of the student farm movement at public agricultural universities.

Purpose, goals, and objectives

The main purpose of this research was to learn more about student farms and perceptions of student farms at public agricultural universities (i.e. LGUs and NARRUs). The goal of this research was to determine the prevalence, characteristics of use, and perceived barriers to student farms at public agricultural universities in the United States. The objectives of this research were to:

- create a list indicating the presence or absence of a student farm at public agricultural universities in the United States.
- create a general map depicting public agricultural universities with and without student farms.
- identify characteristics of student farm use at public agricultural universities.

- describe perceived barriers to student farms at public agricultural universities without student farms.

The results from this research can be used to identify trends, strengths, weaknesses, and areas for future research to further support horticultural/agricultural education and experiential learning opportunities at student farms at public agricultural universities.

Materials and Methods

Survey population selection

In order to compile the most comprehensive lists of LGUs and NARRUs with and without student farms, each university was contacted. Currently, no single organization spans all of these universities; however, by working with two organizations, the Association of Public and Land Grant Universities (APLU) and the First Americans Land-Grant Consortium (FALCON), I was able to request participation from each LGU and NARRU.

The Academic Program Section (APS) is the APLU division focused on “academic programs in agriculture, natural resources, life, and related sciences” ("What is APS?," n.d.). This section includes deans, associate deans, and other officials from the academic colleges and departments of participating public agricultural institutions. The 147 current institutions included in the APS are the 1862 LGUs, 1890 LGUs, and NARRUs ("What is APS?," n.d.).

The FALCON listserv is comprised of the 34 current 1994 LGUs ("1994 land grant," 2017). These institutions are "a heterogeneous group with diverse characteristics and needs ("A planning guide," 2007)." The academic, research, and Extension programs at these institutions are designed to meet the needs of the tribal members served and include areas of cultural, environmental, agricultural, health, and economic value to these communities.

The executive directors for each of these organizations agreed to distribute a recruitment letter and online survey link to their respective listservs. The recruitment letter was drafted using Dillman's recommendations for survey cover letters (Dillman, 1978) and was sent via the respective listservs to an administrative contact at each institution who was asked to forward the letter to the most qualified person to answer questions about student farms.

Instrument design

The online survey was created using Qualtrics Survey SoftwareTM. The exact survey content was determined from a review of previous surveys related to student farms (Leis et al., 2011; Ratasky et al., 2015; Sayre et al., 2011) and adjusted to be more relevant to the survey population of LGUs and NARRUs by relating to their goals of teaching, research, and Extension/outreach.

To maximize clarity and distinguish student farms from agricultural experiment station facilities, a combination of previously proposed student farm definitions was used. The

definition included on the survey was: Student farms are “campus educational facilities that provide hands-on opportunities for students to engage in horticulture, agriculture, and marketing at relatively small scales of production and distribution" (Parr and Trexler, 2011). Student farms are different from experiment station research facilities because of the high level of student labor, leadership, and initiative (Sayre, 2011) provided during planning production, harvesting, and marketing (Holzhueter, 2006). A student farm may be located on experiment station land but must be operated as a separate entity.

After reading the above definition, participants were presented the first question of the survey, which directed them down one of two tracts depending on whether the participating institution currently has a student farm or not. Institutions with student farms were directed to Survey Section A and asked a series of 17 quantitative and qualitative questions. These questions were related to institutional collaboration, student motivation, associated student organizations, use of organic practices, size, annual budget, funding, management, the student farm’s role in teaching, research, Extension/outreach, and a space for other information the participant wished to provide about their student farm. Institutions without student farms were directed to Survey Section B and asked a series of 16 quantitative and qualitative questions. These questions were related to previous use of a student farm, known interest in starting a student farm, adequacy of sites, funding, interest in establishing a student farm, perceptions about the relationship between the student farms and sustainability/organic practices, perceived benefits a student farm would offer their institution, student motivation, adequacy of their current experiential learning opportunities, role a student farm could play in

accomplishing their institution's goals of teaching, research, and Extension/outreach, and a space for other comments and perceptions about why their institution does not currently have a student farm. Depending upon the respondents' answers, some responses triggered follow-up questions to further understand the answers given. Participants on both survey sections were next asked to identify their institution from a list of 1862 LGUs, 1890 LGUs, 1994 LGUs, and NARRUs.

Survey implementation

The survey protocol was approved by the Oklahoma State University (OSU) Institutional Review Board (IRB) prior to distribution of the survey. The recruitment letter and survey link were sent to the APLU and FALCON Executive Directors on January 23, 2018. The final email was sent by the FALCON Executive Director to its listserv on January 25, 2018, and by the APS Executive Director to its listserv on January 30, 2018. Reminder emails were sent by the executive directors approximately one week before the end of the survey. The survey initially ended on February 13, 2018; however, because of a low rate of response on that date, a person at each non-responding university was identified through a simple search of their institution's website. A recruitment letter and survey link was then emailed to each of these people. The survey was completed on March 4, 2018.

Statistical Analysis

Survey data was analyzed using Qualtrics Survey Software™ and descriptive statistics were used to describe the collected responses. The student farm land area and annual operating budget questions were analyzed using the descriptive statistics function in

Microsoft Excel. Responses were analyzed in totality and by institutional categories (ie. 1862 LGUs, 1890 LGUs, 1994 LGUs, and NARRUs).

Results and Discussion

Prevalence of student farms

Valid responses were received from 75 of 181 institutions constituting a response rate of 41.44%. Participating in the survey were 31 of 59 total 1862 LGUs (52.54%), four of 19 total 1890 LGUs (21.05%), 12 of 34 total 1994 LGUs (35.29%), 28 of 69 total NARRUs (40.58%). Of the 75 total survey responses, 31 (41.33%) were from 1862 LGUs, four (5.33%) were from 1890 LGUs, 12 (16%) were from 1994 LGUs, and 28 (37.33%) were from NARRUs.

Of the 75 respondents, 47 (62.67%) have student farms, and 28 (37.33%) do not have student farms (Table 5). Of the 47 institutions with student farms, 22 (46.81%) are 1862 LGUs, none (0.00%) are 1890 LGUs, four (8.51%) are 1994 LGUs, and 21 (44.68%) are NARRUs. Of the 28 institutions without student farms, nine (32.14%) are 1862 LGUs, four (14.29%) are 1890 LGUs, eight (28.57%) are 1994 LGUs, and seven (25.00%) are NARRUs. The lists of institutions with and without student farms (Tables 6 and 7, respectively) are beneficial resources to better understand the student farm movement at LGUs and NARRUs. Due to lack of response from universities, these lists are not all-inclusive; however, because of this study's sole focus on public agricultural institutions, the prevalence of student farms at some institutions which had not previously been identified were identified. Due to the maturity of the student farm movement, large

number of universities in the United States, and the regular rate of leadership turnover at student farms, previous student farm lists and directories ("A directory of," n.d.; Parr, 2009; Sayre et al., 2011) are also not all-inclusive or are outdated. No doubt, in the months or years to come, the lists from this study will be outdated as well, but this study is an important benchmark for the status of student farms at LGUs and NARRUs in 2018. A national association of student farms would be a beneficial resource to institutions with student farms and those interested in starting student farms by fostering communication with a wider range of universities, centralizing knowledge and resources, and conducting much-needed student farm research.

An objective of this survey was to create maps of geographical distribution of LGU and NARRU institutions with and without student farms in the United States at its territories. The distribution of LGU and NARRU institutions with student farms are shown in Figure 1. The distribution of LGU and NARRU institutions without student farms are shown in Figure 2. The maps of institutions with and without student farms show a greater distribution of universities in the Midwest, Southern, and Central United States than other student farm maps and publications (Leis et al., 2011; Parr, 2009; Ratasky et al., 2015; Sayre et al., 2011). Much of this is due to differences in survey populations, communication networks, and methods by which information was obtained. It is important to see these maps not as having deficiencies in information; instead that by combining available information from multiple sources, a more complete picture is formed of the true prevalence of student farms in the United States.

Survey Section A: Institutions with Student Farms

Student Farm Use

Only two (4.26%) student farms, both 1994 LGUs, are managed as a collaborative effort between multiple universities (Table 8). None of the student farms at 1862 LGUs or NARRUs were part of collaborations with other universities; however, two of the four (50%) 1994 LGUs are involved in student farm collaborations with other universities. The student farm collaboration between the two 1994 LGUs is an example of increasing opportunities by maximizing limited resources. More information is needed to know whether these two institutions are collaborating with one another or with institutions which did not participate in the survey. Collaboration between 1994 LGUs and other institutions promotes academic and research opportunities as well as increased cultural awareness between both parties; however, project planning, cultural sensitivity and institutional consent are necessary in order to achieve the desired benefits (Halvorson, 2016).

According to 44 of 47 institutions (93.62%) (Table 8), students are motivated to do the necessary farm work. Only one university in each of the responding categories (1862 LGUs, 1994 LGUs, and NARRUs) indicated otherwise. When asked about factors that motivated the students, 37 (41.11%) indicated self-motivated, 25 (27.78%) indicated a course requirement, 22 (24.44%) indicated monetary compensation, and six (6.67%) indicated other factors (data not shown). Some of these other motivators included internship credit, sense of community/being part of something bigger, and opportunities for experiential learning/group projects. For the motivating factor question, there was a

total of 90 responses which is more than the number of participating institutions because respondents could choose more than one answer. Proportions of each motivating factor were similar between 1862 LGUs and NARRUs. Students' overwhelming motivation to participate in student farms is promising for the continued success of the student farm movement. The similarity between results at 1862 LGUs, NARRUs, and to a lesser extent because of less responses, 1994 LGUs, indicated a universality among students who participate in student farms at these universities. The additional comments from this survey and findings of Parr and Trexler (2011) agreed demonstrating that students participated for a variety of reasons. These included personal, intangible reasons such as being a part of something bigger than themselves, gaining a sense of community with others working toward a common goal, and experiential learning. The more tangible reasons of course requirements and monetary compensation agreed with findings of Leis et al. (2011). Additional comments from the institutions without student farms demonstrated students at some universities are not motivated to take part in the work at the university's greenhouse and the respondent from that institution doubted students would participate adequately on a student farm. This is a plausible scenario in certain situations at many universities. Hands-on experiences at student farms, especially organic and sustainability-focused student farms, have been shown to contribute to successfully engaging and attracting students from non-traditional backgrounds and non-agriculture majors (Markhart, 2006; Schroeder et al., 2006); therefore, a comparative study is needed to identify the demographics and backgrounds of students participating in student farms compared to those in experiential learning activities where student motivation is lacking.

The proportion of universities with student organizations related to the student farm were almost equal with 23 of the 47 (48.94%) having related organizations and 24 of the 47 (51.06%) not having related student organizations (Table 8). Differences were more evident between institutional categories with 13 1862 LGUs (59.09%) having related student organizations and 12 NARRUs (57.14%) not having related student organizations. One of four 1994 LGUs (25.00%) have related student organizations. Almost half of the institutions with student farms also had related student organizations; however, because nearly 60% of 1862 LGUs have student farms and nearly 60% of NARRUs do not have student farms, further research is necessary to determine the reasons for these opposite results from comparable agricultural universities. The percentage of student farms at 1862 LGUs is most comparable to a previous nationwide survey of student farms at a variety of agricultural and non-agricultural universities which found 75% to be associated with student organizations (Leis et al., 2011).

Organic production practices are used on 57.45% of the farms (Table 8). The remaining 42.55% of student farms do not use organic production practices. In addition, 81.82% of 1862 LGUs use organic production practices while 76.19% of NARRUs do not use organic production practices. All of the 1994 LGUs use organic production practices. In relation to organic production at student farms, the opposite trend between 1862 and NARRUs continues. With over 81% of 1862 LGU student farms using organic production practices it seems that 1862 LGUs are responding to increased industry demands ("2012 Organic Land," 2012); however, with 76% of NARRUs not using organic production practices, NARRUs appear to be less responsive than other

institutions. Of 1994 LGUs, 100% use organic practices, which is not unexpected given the environmental science emphasis many 1994 LGUs have in the majors and courses they offer. Since diverse production methods increase opportunities for hands-on learning (Parr et al., 2007), further research should evaluate the degree to which organic production methods are used (i.e. only organic practices, some organic practices, or "sustainable" practices) and students' competencies with all types of production systems.

The university departments responsible for student farms varied from institution to institution. Most notably, agriculture (44.68%) and plant and related sciences including horticulture, crop sciences, landscape architecture, and natural resources (34.04%) collectively made up 78.72% of responses. Environmental sciences and animal sciences each accounted for 6.38%. Among the various descriptions of the responsible departments, there is a wide variety of diversity and university configurations at the responding institutions. One institution specified that the student farm was a multidisciplinary part of the school of agriculture and another institution commented that while the student farm is administered by agriculture, the advisor and almost all participating students are from other majors. Institutional categories yielded differences in departments responsible for student farms. Almost 73% of student farms at 1862 LGUs were in plant and related sciences departments of which half specified horticulture. Only 13.64 % of 1862 LGU student farms are housed from colleges/departments of agriculture as a whole. Almost the exact opposite is true of NARRUs with 80.95% housed by colleges/departments of agriculture, 14.29% in animal science or biology and no departments of plant and related sciences including horticulture. Of the 1994 LGUs,

environmental science and Extension were the only responses with none specifying agriculture or horticulture. This is certainly an area for future research to better understand how diverse institutions utilize student farms.

The mean land area of the 47 student farms was 84.27 ha (Table 9). The mean student farm land areas were considerably smaller at 1862 LGUs (7.73 ha) and 1994 LGUs (10.78 ha). On average NARRUs student farms were much larger (451.14 ha). A wide range of student farm sizes exist with 22 (46.81%) less than 2.43 ha, three (6.38%) between 4.05 and 6.07 ha, four (8.51%) between 10.12 and 21.85 ha, and 18 (38.30%) between 44.52 and 728.42 ha. Of the 22 student farms 0 to 2.43 ha in size, 17 (77.27%) are 1862 LGUs, three (16.64%) are 1994 LGUs, and two (9.09%) are NARRUs. All three of the student farms 4.05 to 6.07 ha in size were 1862 LGUs. Of the four student farms 10.12 to 21.85 ha in size, two (50.00%) are 1862 LGUs, one (25.00%) is a 1994 LGU, and one (25.00%) is a NARRU. All of the 18 student farms 44.52 to 728.42 ha in size are NARRUs. The large land area for NARRUs seems as if these farms are not the same as the smaller student farm models that have been described in many other academic publications. However, even the inventory of student farms created by Sayre et al. (2011) includes large land areas for some of the universities, including some of the NARRUs which responded to this survey.

The mean annual budget was $369,459 for the 37 respondents who answered this question (Table 10). Broken into categories, the mean was $133,167 for 1862 LGUs, $61,250 for 1994 LGUs, and $735,200 for NARRUs. Of the 37 student farms participants

which responded to this question, ten (27.02%) operate on an annual budget between of $0-15,000, 14 (37.84%) operate on an annual budget of $30,000-125,000, and 13 (35.14%) operate on an annual budget of $174,000-7,000,000. Of the ten in the lowest budget category, three (30.00%) are 1862 LGUs, three (30.00%) are 1994 LGUs, and four (40.00%) are NARRUs. Of the 14 in the middle budget category, nine (64.29%) are 1862 LGUs, one (7.14%) is a 1994 LGU, and four (28.57%) are NARRUs. Of the 13 in the largest budget category, six (46.15%) are 1862 LGUs and seven (53.85%) are NARRUs. The large difference in budget between 1862 LGUs and NARRUs indicates that the farm facilities described are very different and calls into question whether the NARRU facilities would be considered "small-scale" as suggested in the student farm definition.

Student farms were used for teaching by 39.47%, research by 33.33%, and Extension/outreach by 27.19% of respondents (Table 11). The total percentage adds up to more than 100% indicating that respondents could choose more than one answer. The proportions of teaching, research, and Extension/outreach were almost equal to one another at 1994 LGUs. The proportions of use by teaching, research, and Extension/outreach at 1862 LGUs and NARRUs were very similar even though LGUs are authorized by the Smith-Lever Act ("Smith-Lever Act," 1914) to conduct Extension activities and NARRUs are not. However, apparently many NARRUs still do community outreach and public service through their student farms.

Coordination of student farm work varied from institution to institution as well with 76.63% being managed by a collection of staff farm manager(s) (34.58%), faculty member(s) (30.84%), and administrator(s) (11.21%) (Table 12). These statistics add up to more than 100% indicating that respondents could choose more than one option. Farms managed by graduate (6.54%) and undergraduate (13.08%) students made up a total of 19.62% of student farms. The only specified response in the "other" category was Ameri-Corp volunteers. Ninety-three percent of student farms were coordinated by staff farm managers (39.13%), faculty members (39.13%), or administrators (15.22%). At NARRUs, students coordinated only 6.52% of farms. At 1862 LGUs, the number of administrator-coordinated student farms were slightly less (5.66%), while the number of student-coordinated student farms were greater (26.41%). Only four universities indicated that volunteers coordinated the work at their student farms. The large number of student farms coordinated by a staff position farm manager agreed with the recommendations of Ratasky et al. (2015) and experiences of Biernbaum (2011). One 1862 LGU commented that the only way to maintain a successful Community Supported Agriculture program (CSA) was to employee a full-time farm manager who is in charge and student workers who gain valuable experience with planning, management, and production. This type of situation with a small-scale farm and high student initiative and involvement throughout the entire production process is likely different from management of large-scale experiment stations who often have full-time farm managers and purely labor opportunities for students. There was a lower number than expected of student farms coordinated by outside volunteers such as Master Gardeners and other service-oriented groups. Further investigation should be conducted to determine if this is

an underutilized resource of student farms or if it has just been used unsuccessfully in the past.

The sources for funding varied greatly from institution to institution with 28.93% coming from university/college general funds generated from tuition, fees, and institutional allocation. Smaller percentages were from Agricultural Experiment Station budgets (5.79%) and Cooperative Extension Service budgets (3.31%). Grants and donations made up 19.83% and 13.22%, respectively. Farm-generated sources such as a farm stands/stores, campus dining contracts, on-campus CSAs, and farmers markets supported 27.27% of budgets. Other sources of income accounted for only 1.65% of responses. The total percentages added up to more than 100% indicating that respondents could choose more than one answer. Agricultural experiment station budgets, donations, and farm generated sources were not parts of 1994 LGUs student farms. As evidenced by other comments, funding continues to be a challenge for operating student farms. Half of the 16 1862 LGUs who specified farm generated income went on to further specify that CSAs were part of their funding strategy. Thirteen of the 16 1862 LGUs specified they sell their produce at farmers markets or farm stands, many on their university campuses. Since many student farms have found success in CSAs and campus farm stand models of farm-generated income, this is an area that could use considerable future research to help more institutions develop successful financial models for their student farms. This is also an area that could increase the interdisciplinary nature of student farm research by including more agricultural business and agricultural economics students and professors.

Student Farm Perceptions

On the topic of the student farm enhancing classroom instructional and learning opportunities 85.11% strongly agreed, 12.77% somewhat agreed, 2.13% neither agreed nor disagreed, and none somewhat disagreed or strongly disagreed (Figure 3). On the topic of role of the student farm in conducting research that is different from that conducted on experiment station facilities, 42.55% strongly agreed, 31.91% somewhat agreed, 14.89% neither agreed nor disagreed, 8.51% somewhat disagreed, and 2.13% strongly disagreed (Figure 3). On the topic of using the student farm to educate the public about agriculture and/or horticulture, 61.70% strongly agreed, 31.91% somewhat agreed, 4.26% neither agreed nor disagreed, 2.13% somewhat disagreed, and none strongly disagreed (Figure 3). On the topic of the student farm helping accomplish the LGU or university's mission, 65.96% strongly agreed, 19.15% somewhat agreed, 12.77% neither agreed nor disagreed, 2.13% somewhat disagreed, and none strongly disagreed (Figure 3).

Additional comments and discussion

When asked for additional comments that would be helpful for better understanding the student farms at their institution, participants shared challenges with funding, importance of hands-on experiences gained at the student farm, and other assorted comments about how their farm functions.

Given the large number of student farms managed by entire colleges/departments of agriculture at NARRUs and the land area and budgets of those farms, it is extremely

likely that these institutions consider their entire farm facilities to be student farms. This is in contrast to most of the 1862 LGU student farms which are smaller in land area and budget and most often managed by individual departments, specifically plant science based departments (i.e. horticulture, agronomy, plant & soil sciences) within a larger college of agriculture. The definition of student farm that was used for the survey specified that student farms are generally small in scale, whereas it seems that few of the NARRUs would be considered small in scale based on land area or budget. In trusting the respondents' knowledge of their institutions' student farms, it is also important to take into consideration potential differences in animal-based student farms and plant-based student farms and the effects those differences would have on land area, budgets, and organic production methods since those results were drastically different from those of the more typical 1862 LGU student farms. There is a need within the student farm community to better define what constitutes a student farm and promote student farm establishment to universities which may have little exposure to the movement that is taking place.

Survey Section B: Institutions without Student Farms

Previous farms and current interest

Of the institutions that do not currently have student farms, 85.71% have never had student farms, and only 14.29% had previously had a student farm (Table 13). Some specified that their farms were discontinued in the 1950s. Most did not know the exact reason the farms were discontinued but some speculated the change was associated with

major changes in the university's agriculture focus. The institutions which previously had a student farm were 50% 1890 LGUs and 50% NARRUs.

Of those without student farms, 82.14% are aware of students, staff, faculty and/or administrators who are interested in starting a student farm at their institution (Table 13). At least 75% of institutions in each institutional category were aware of student farm interest. There is an abundance of resources available for those interested in starting student farms. One of the most innovative is the Campus Farmers online community ("Eating is an," n.d.). Stories detailing how other LGUs have started student farms abound (Ashling et al., 2007; Biernbaum et al., 2006; Markhart, 2006; Parr and Van Horn, 2006; Reeve et al., 2014; Schroeder et al., 2006) but due to the diversity of institutions, more resources on all topics related to student farm development should be created and made more widely accessible through a platform such as Campus Farmers or a national student farm association.

Student farm perceptions

On the topic of their institution lacking an adequate site, 7.14% strongly agreed, 10.71% somewhat agreed, 21.43% neither agreed nor disagreed, 25.00% somewhat disagreed, and 35.71% strongly disagreed (Figure 4). On the topic of lacking adequate funding, 39.29% strongly agreed, 21.43% somewhat agreed, 21.43% neither agreed nor disagreed, 10.71% somewhat disagreed, and 7.14% strongly disagreed (Figure 4). When asked about student farms only being for those interested in sustainability or organic production, 0% strongly agreed, 3.57% somewhat agreed, 10.71% neither agreed nor

disagreed, 32.14% somewhat disagreed, and 53.57% strongly disagreed (Figure 4). With over 85% disagreeing that student farms are explicitly for those interested in sustainability or organic production, greater consideration should be given to this topic in light of the definition used by Sayre (2011) which requires environmental stewardship and sustainability to qualify as a student farm. While many student farms do emphasize these aspects, the terms themselves are often ambiguous and contribute to poor clarity around this issue.

On the topic of lacking enough faculty and staff interest, 3.57% strongly agreed, 14.29% somewhat agreed, 25.00% neither agreed nor disagreed, 39.29% somewhat disagreed, and 17.86% strongly disagreed (Figure 5). With 82% of institutions aware of individuals interested in starting a student farm and more than 57% rejecting the notion that there is not enough faculty or staff interest for a student farm to operate successfully, this barrier could potentially be overcome by gathering interested individuals to discuss the possibility of student farm development at these institutions.

On the topic of lacking student interest, 3.57% strongly agreed, 17.86% somewhat agreed, 39.29% neither agreed nor disagreed, 21.43% somewhat disagreed, and 17.86% strongly disagreed (Figure 5). This breakdown is not widely different from that of faculty and staff interest. When considering the responses of institutions with student farms in relation to student motivation, there is a wide capability, at least at some universities and student populations, to motivate themselves to participate on student farms. On the topic of students not being motivated enough to successfully operate a student farm: 3.57%

strongly agreed, 25.00% somewhat agreed, 28.57% neither agreed nor disagreed, 28.57% somewhat disagreed, and 14.29% strongly disagreed (Figure 5).

When asked if current opportunities for experiential learning are already adequate without a student farm, none strongly agreed, 10.71% somewhat agreed, 39.29% neither agreed nor disagreed, 28.57% somewhat disagreed, and 21.43% strongly disagreed (Figure 5). With only 10% of institutions believing their current experiential learning opportunities are adequate, there is great potential for student farms to be the medium for teaching a wide range of interdisciplinary topics related to agriculture and society (Ratasky et al., 2015). Perhaps this is the exact reason that student farms have become so popular at liberal arts colleges (Gardner, 2012).

On the topic of experiential learning opportunities on a student farm doing nothing to enhance courses: none strongly agreed or somewhat agreed, 25.00% neither agreed nor disagreed, 14.29% somewhat disagreed, and 60.71% strongly disagreed (Figure 6). On the topic of a student farm offering no benefit for research over our experiment station research facilities: 7.14% strongly agreed, 7.14% somewhat agreed, 10.71% neither agreed nor disagreed, 32.14% somewhat disagreed, and 42.86% strongly disagreed (Figure 6). On the topic of a student farm offering no benefit for Extension/outreach: 7.14% strongly agreed, 7.14% somewhat agreed, 7.14% neither agreed nor disagreed, 17.86% somewhat disagreed, and 60.71% strongly disagreed (Figure 6). When asked if a student farm would help accomplish the LGU or university mission, 50.00% strongly

agreed, 17.86% somewhat agreed, 28.57% neither agreed nor disagreed, none somewhat disagreed, and 3.57% strongly disagreed (Figure 6).

Additional comments and discussion

Other comments that were provided showed that while it may not be on the scale of a student farm, at least nine out of 21 (42.86%) of the institutions already have some type of student garden, community garden, or garden project for experiential learning or are in the process of establishing a student farm or garden. This further demonstrates a need for discipline-wide clarification of terms related to student farms and campus agriculture projects (LaCharite, 2016). Others institutions commented on the opportunities students get at the experiment station facilities, while acknowledging a student farm would provide a deeper level of experiential learning to students. One institution said that internships are necessary sources of income for students, and it is important to place them in jobs where students get "real farm and ranch experience." Another institution recognized major challenges being the barriers to students getting their ideas off the ground and the lack of student labor during the summer session. It is important to note that these issues have largely been overcome by other institutions, and a more prevalent nationwide discussion of student farms could help alleviate future fears and barriers to student farm establishment. Sharing student farm successes and failures could greatly benefit future student farm development.

Summary

More than 25% of public agricultural universities (LGUs and NARRUs) have student farms, and at least 15% of public agricultural universities (LGUs and NARRUS) do not have student farms. While it is likely that the number of student farms is much higher, a comprehensive list is difficult to create due to the lack of an established network or organization for student farms and the high turnover in student farm management. This research strengthens previous studies by providing additional insight on institutions which were not previously surveyed and adding information on perceptions of student farms at universities which do not have them.

Student farm collaborations between multiple universities are not common though the institutions that have them exhibit a wide diversity of institutional and departmental configurations. Student farms at these institutions are diverse and vary greatly in size, budget, and use. Major differences exist between student farms at 1862 LGUs and NARRUs especially in the areas of association with student organizations, use of organic production practices, and responsible department. Student farms are widely used for teaching, research, and Extension/outreach. Students are generally self-motivated to participate in farm work, and the majority of student farms are coordinated by a staff position farm manager or faculty member. Student farms are funded primarily by university/college budgets, farm-generated income, grants, and donations. Despite less than desirable situations and continual funding needs, the majority of respondents agree that student farms play an important role in enhancing classroom instruction, conducting unique research, educating the public about agriculture/horticulture, and helping accomplish the LGU/university mission.

Most institutions without student farms have never had them though the majority of institutions know of individuals who are interested in starting a student farm. Institutions without student farms generally agree that there are adequate locations and faculty support for a student farm. However, lack of funding is a concern among many universities and adequate student interest to maintain a student farm is neutral or lacking. These institutions recognize that a student farm could enhance classroom instruction, provide new opportunities for research, benefit Extension/outreach efforts, and help accomplish the LGU/university mission.

The experiences provided by institutions with student farms are helpful for those without student farms to see how real and perceived challenges can be overcome in the quest for providing experiential learning opportunities for students through student farms at public agricultural universities. However, without continuing to overcome some common challenges among student farms and rallying for more administrative support, the potential of student farms will never be fully known (Ratasky et al., 2015).

Some limitations of this research include difficulty in contacting the most qualified person at each institution and receiving prompt responses. This can partly be attributed to the diversity of institutions and student farm models, while it is also partly due to lack of institutional awareness of student farm activities or the person in charge. In addition, even though the student farm definition used was in an attempt to be extremely clear, it is obvious that respondents, especially from NARRUs, interpreted it in the broadest sense

and could have included facilities that resemble agricultural experiment stations more than the most common manifestations of student farms.

Over the last decade, much has been done to better understand the student farm movement at higher education institutions in the United States. The research that has been conducted has helped student farms to be established and improved. While this academic discipline has come very far, there are still gaps in our understanding and ability to effectively use student farms. Some areas for future research include continuing to identify characteristics that set student farms apart from other campus farm facilities, most notably the aspect of student initiative and leadership. Great needs exist to further create a community of student farm advocates and participants who are able to share knowledge and experiences while helping others overcome challenges and barriers. Great progress has been made during the last decade to better understand the use and impacts of student farms at higher education institutions, and it is clear that students and institutions are reaping the benefits of experiential learning opportunities on student farms. However, there is still much research to be done in this area for the future improvement of student learning experiences though the use of student farms at public agricultural universities.

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Table 5. Student farm prevalence by total responses and institutional categories (n=75).

Does your institution have a student farm?	Yes		No	
	#	%	#	%
All	47	62.67	28	37.33
1862 LGUs (n=31)	22	46.81	9	32.14
1890 LGUs (n=4)	0	0.00	4	14.29
1994 LGUs (n=12)	4	8.51	8	28.57
NARRUs (n=28)	21	44.68	7	25.00

Table 6. Public agricultural universities with student farms as surveyed through listservs of the Academic Program Section (APS) of the Association of Public and Landgrant Universities (APLU) and the First Americans Landgrant Consortium (FALCON).

1862 LGUs	1994 LGUs	NARRUs
• Auburn University • Cornell University • Kansas State University • Michigan State University • Montana State University • North Carolina State University • Purdue University • Rutgers University • Texas A and M University • The Pennsylvania State University • University of Florida • University of Georgia • University of Illinois (at Urbana-Champaign) • University of Kentucky • University of Maryland, College Park • University of Massachusetts, Amherst • University of Minnesota • University of Nevada • University of Puerto Rico • University of Vermont • University of Wyoming • Utah State University	• Bay Mills Community College • Navajo Technical College • Nebraska Indian Community College • Salish Kootenai College	• Abraham Baldwin Agricultural College • Arkansas State University • California Polytechnic State University—San Luis Obispo • California State University—Chico • California State University—Fresno • Illinois State University • McNeese State University • Middle Tennessee State University • Morrisville State College • Murray State University • Nicholls State University • Northwest Missouri State University • Oklahoma Panhandle State University • Southeast Missouri State University • Southern Arkansas University • Stephen F. Austin State University • Tarleton State University • Texas A and M University—Kingsville • University of Central Missouri • University of Tennessee—Martin • University of Wisconsin—River Falls

Table 7. Public agricultural universities without student farms as surveyed through listservs of the Academic Program Section (APS) of the Association of Public and Landgrant Universities (APLU) and the First Americans Landgrant Consortium (FALCON).

1862 LGUs	1890 LGUs	1994 LGUs	NARRUs
• American Samoa Community College • North Dakota State University • Northern Marianas College • Oklahoma State University • The University of Rhode Island • University of Arizona • University of Arkansas • University of Delaware • University of Missouri—Columbia	• Central State University • Kentucky State University • Langston University • University of Arkansas at Pine Bluff	• Blackfeet Community College • Chief Dull Knife College • Fond du Lac Tribal and Community College • Little Priest Tribal College • Saginaw Chippewa Tribal College • Sisseton Wahpeton College • Sitting Bull College • United Tribes Technical College	• Arkansas Tech University • Chadron State University • Glenville State College • Kent State University—Salem • Michigan Technological University • Southern Utah University • Texas Tech University

Table 8: Student farm use by total responses and institutional categories (n=47).

		Yes	%	No	%
Is the student farm a collaboration with another university?	All	2	4.26	45	95.74
	1862 LGUs	0	0.00	22	100.00
	1994 LGUs	2	50.00	2	50.00
	NARRUs	0	0.00	21	100.00
Are students motivated to participate in the necessary farm work?	All	44	93.62	3	6.38
	1862 LGUs	21	95.45	1	4.55
	1994 LGUs	3	75.00	1	25.00
	NARRUs	20	95.24	1	4.76
Is there a student organization related to the student farm?	All	23	48.94	24	51.06
	1862 LGUs	13	59.09	9	40.91
	1994 LGUs	1	25.00	3	75.00
	NARRUs	9	42.86	12	57.14
Does the student farm use organic production practices?	All	27	57.45	20	42.55
	1862 LGUs	18	81.82	4	18.18
	1994 LGUs	4	100.00	0	0.00
	NARRUs	5	23.81	16	76.19

Table 9: Student farm land area by total responses and institutional categories.

Land area (ha)	0-2.43		4.05-6.07		10.12-21.85		44.52-728.42		Mean
	Count	%	Count	%	Count	%	Count	%	
All (n=47)	22	46.81	3	6.38	4	8.51	18	38.30	84.27
1862 LGUs (n=22)	17	77.27	3	100.00	2	50.00	0	0.00	7.73
1994 LGUs (n=4)	3	16.64	0	0.00	1	25.00	0	0.00	10.78
NARRUs (n=21)	2	9.09	0	0.00	1	25.00	18	100.00	451.14

Table 10: Student farm annual budget by total responses and institutional categories.

Annual operating budget (USD)	0-15,000		30,000-125,000		175,000-7,000,000		Mean
	Count	%	Count	%	Count	%	
All (n=37)	10	27.02	14	37.84	13	35.14	369459
1862 LGUs (n=18)	3	30.00	9	64.29	6	46.15	133166
1994 LGUs (n=4)	3	30.00	1	7.14	0	0.00	61250
NARRUs (n=15)	4	40.00	4	28.57	7	53.85	735200

Table 11: Student farm use within teaching, research, and Extension/outreach (n=114).

	Teaching		Research		Extension/ outreach	
	#	%	#	%	#	%
All	45	39.47	38	33.33	31	27.19
1862 LGUs	22	39.29	18	32.14	16	28.57
1994 LGUs	2	25.00	3	37.50	3	37.50
NARRUs	21	42.00	17	34.00	12	24.00

Table 12: Coordination of work on student farms (n=107).

	#	%
Faculty member(s)	33	30.84
Staff farm manager(s)	37	34.58
Graduate student(s)	7	6.54
Undergraduate student(s)	14	13.08
Administrator(s)	12	11.21
Alumni	0	0.00
Community volunteer(s)	3	2.80
Other	1	0.93

Table 13: Previous student farms and current student farm interest (n=28).

		Yes	%	No	%
Has your institution previously had a student farm?	All	4	14.29	24	85.71
	1862 LGUs	0	0.00	9	100.00
	1890 LGUs	2	50.00	2	50.00
	1994 LGUs	0	0.00	8	100.00
	NARRUs	2	28.57	5	71.43
Are you aware of any students, staff, faculty, and/or administrators who are interested in starting a student farm?	All	23	82.14	5	17.86
	1862 LGUs	7	77.78	2	22.22
	1890 LGUs	3	75.00	1	25.00
	1994 LGUs	7	87.50	1	12.50
	NARRUs	6	85.71	1	14.29

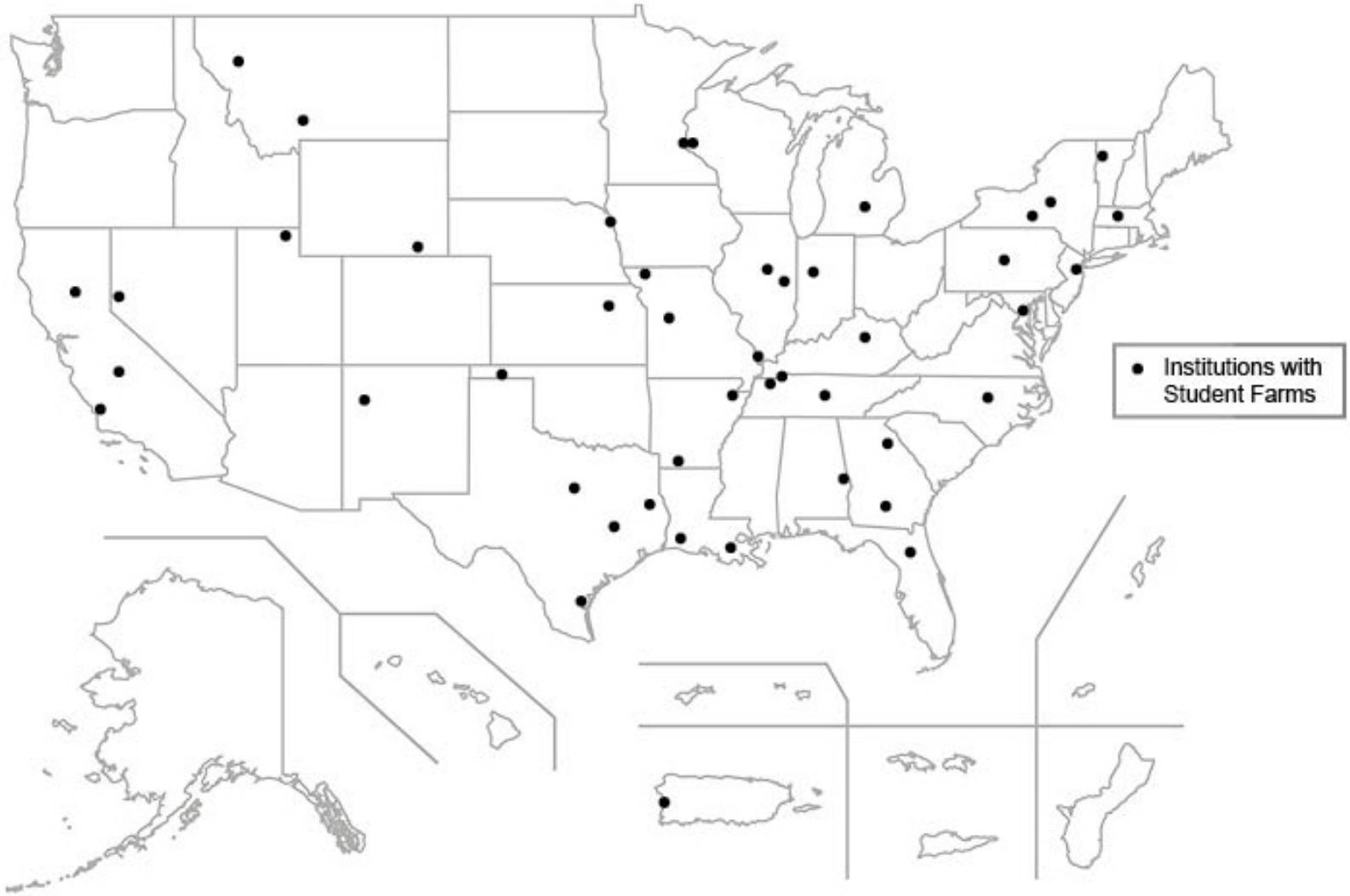

Figure 1. Map of public agricultural universities with student farms as surveyed through listservs of the Academic Program Section (APS) of the Association of Public and Landgrant Universities (APLU) and the First Americans Landgrant Consortium (FALCON).

Figure 2. Map of public agricultural universities without student farms as surveyed through listservs of the Academic Program Section (APS) of the Association of Public and Landgrant Universities (APLU) and the First Americans Landgrant Consortium (FALCON).

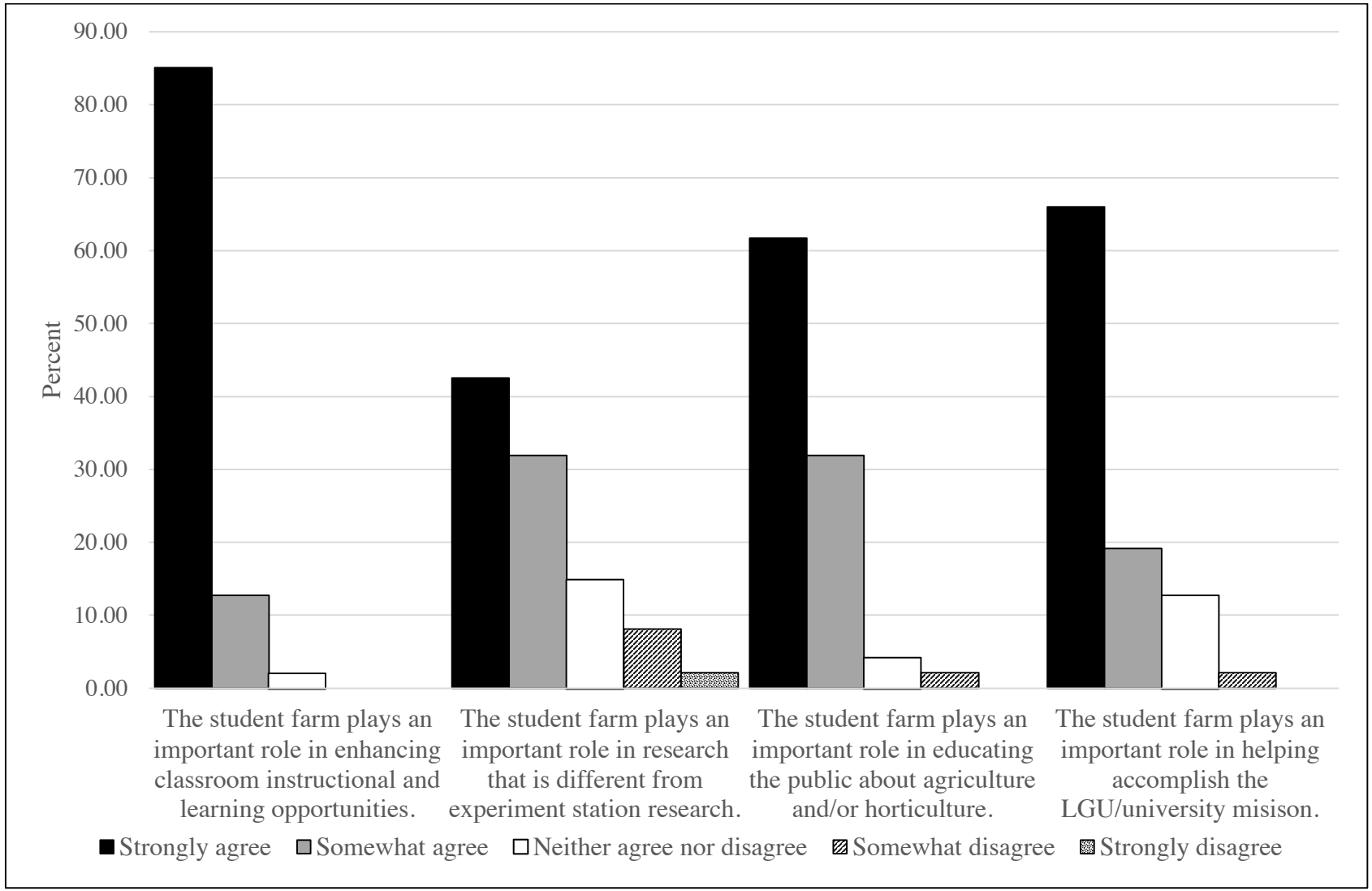

Figure 3. Perceived roles of student farms at public agricultural universities (n=47).

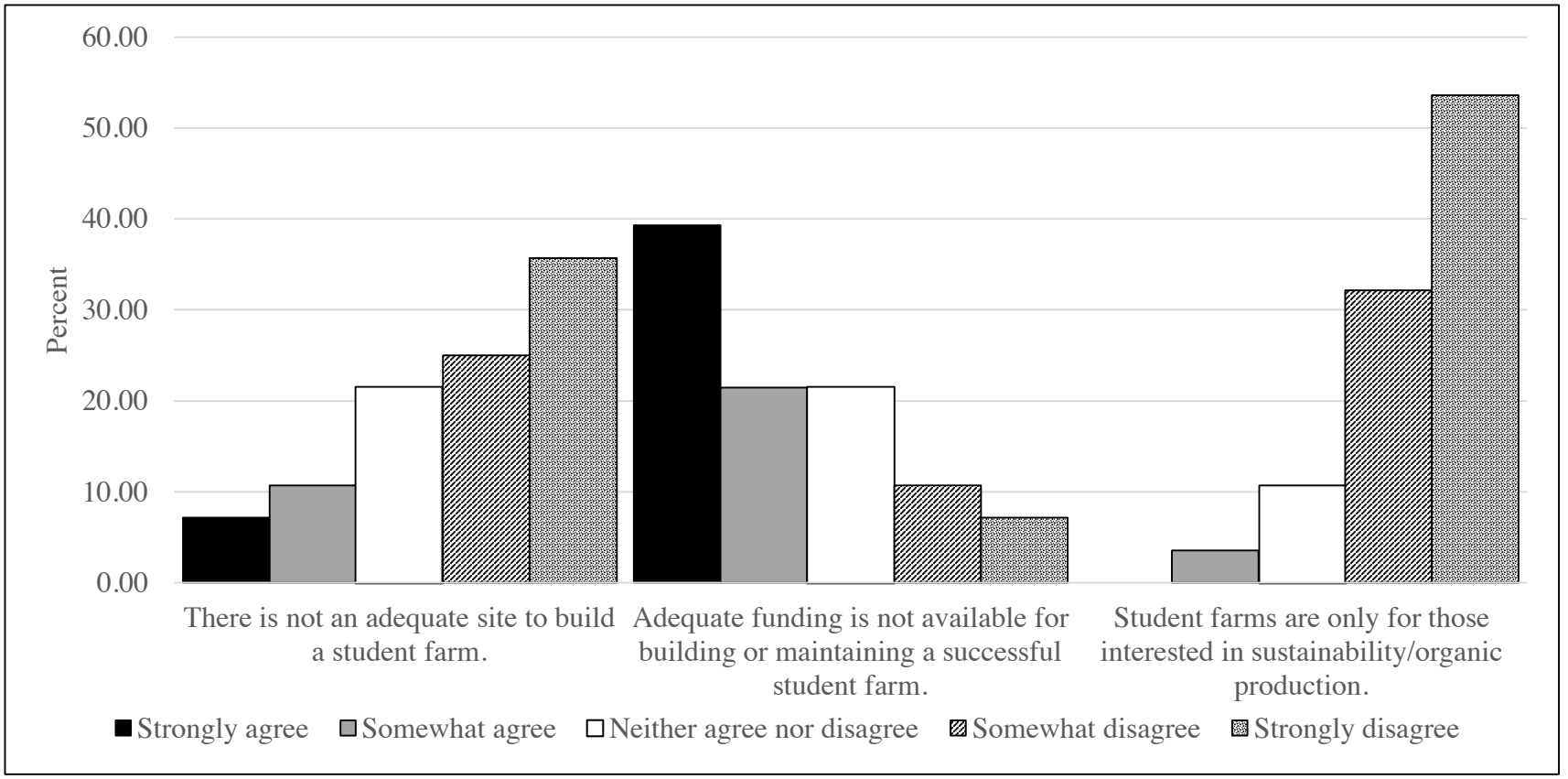

Figure 4: Perceived barriers to student farms at universities without student farms (n=28).

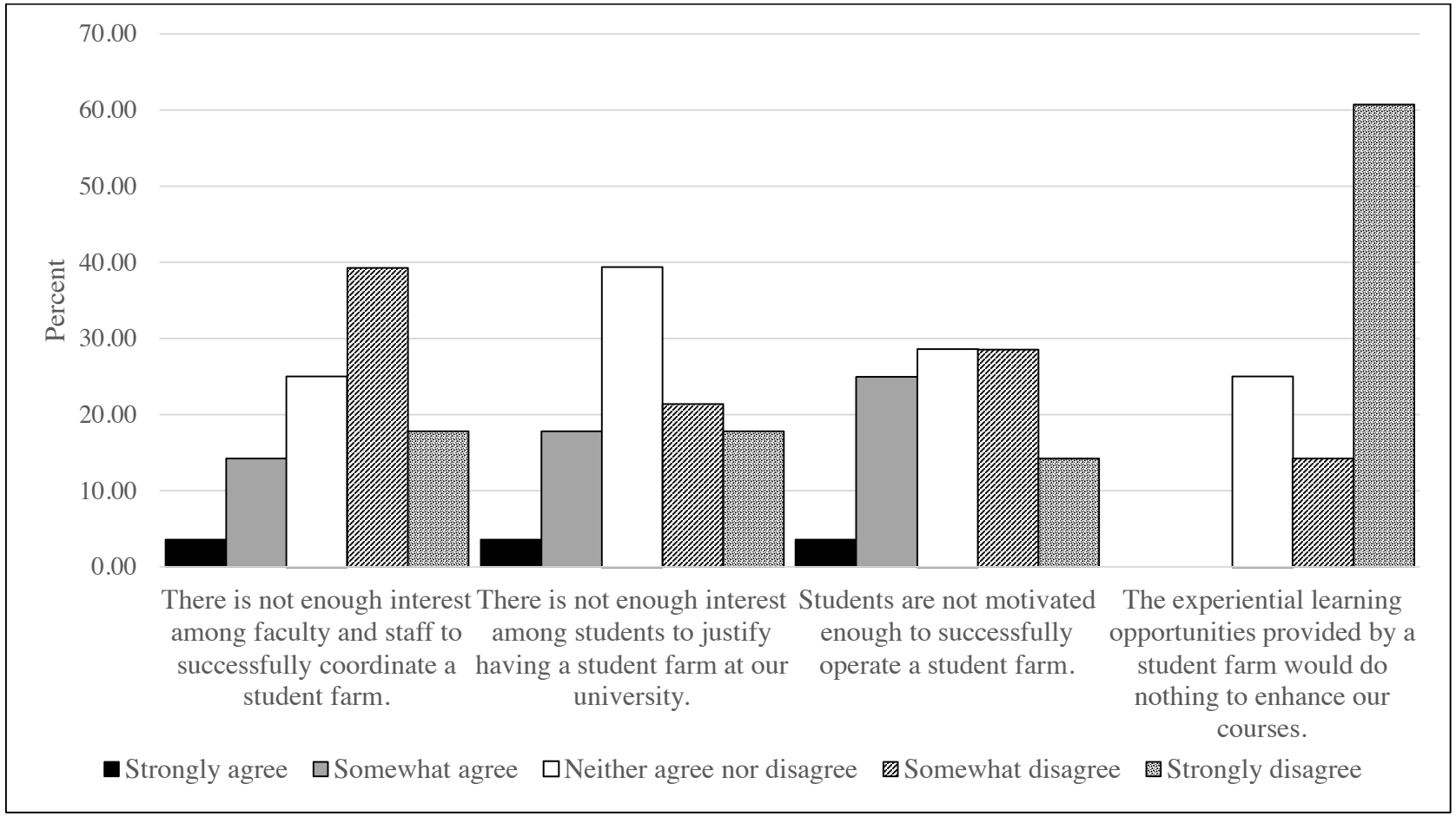

Figure 5: Perceived barriers to student farms at universities without student farms (n=28).

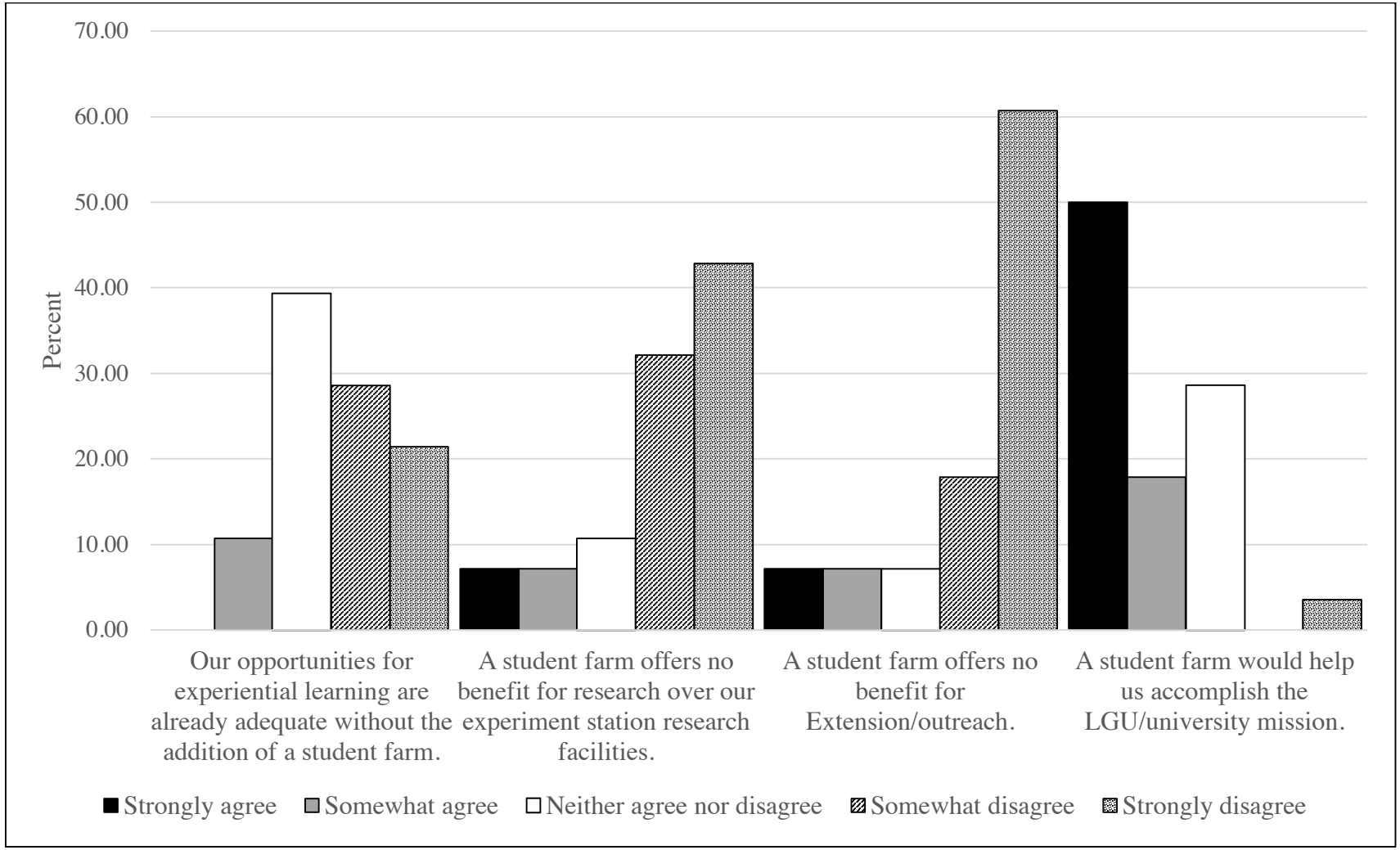

Figure 6: Perceived usefulness of student farms at universities without student farms (n=28).

APPENDIX

APPENDIX A—IRB FORM

Oklahoma State University Institutional Review Board

Date:	Friday, January 19, 2018
IRB Application No	AG1763
Proposal Title:	Prevalence, characteristics and perceptions of student farms at Land Grant Universities (LGU) and Non-land-grant Agriculture and Renewable Resources Universities (NARRU) in the United States
Reviewed and Processed as:	Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 1/18/2021

Principal Investigator(s):

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The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

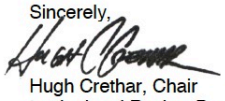
☐ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,



Hugh Crethar, Chair
Institutional Review Board

Dear _____:

Student farms have been on the rise in recent years at a variety of universities throughout the United States. This is a fascinating trend within tertiary education and has helped increase student interest in agriculture. However, as agricultural educators and researchers, we do not know how our universities use and perceive student farms. Can student farms help our universities accomplish their missions? We believe that your institution's perspective is important to the agricultural community.

Our goal is to receive a survey response from each of the 114 Land Grant Universities (LGU) and 69 Non-land-grant Agriculture and Renewable Resources Universities (NARRU). Your assistance and participation will help us accomplish this goal. As the contact person for your institution, we need your help. ***Will you please forward this email to the person at your institution who is most qualified to answer questions pertaining to the use and perceptions of student farms?***

Most importantly, your participation is voluntary, and your identity is confidential. With the exception of creating a map and list of universities with and without student farms, all other data will be reported in averages and will not identify individuals or their universities. Again, this will help the agricultural community understand the uses and perceptions of student farms at agricultural institutions. Your university's participation will strengthen the results of this study.

Please click the following link to access the survey: _____. Upon completion of the survey, you will have the option to request a copy of the results of the study as a benefit for your participation.

I am happy to answer any questions that might arise. Please contact me at matthew.barton@okstate.edu or 256-390-7020.

Thank you for your assistance.

Sincerely,

Matthew Barton

Matthew P. Barton
Graduate Research Assistant
Department of Horticulture and Landscape Architecture
Oklahoma State University

PARTICIPANT INFORMATION
OKLAHOMA STATE UNIVERSITY

Title: Prevalence, characteristics, and perceptions of student farms at Land Grant Universities and Non-land-grant Agriculture and Renewable Resources Universities in the United States

Investigators: Matthew Barton, B.S. Lynn Brandenberger, Ph.D.
Justin Q. Moss, Ph.D. Bruce Dunn, Ph.D.
Joshua Ringer, Ph.D. James Key, Ph.D.

Purpose: The purpose of the research study is to determine the prevalence, characteristics of use, and perceived barriers to student farms at Land Grant Universities (LGU) and Non-land-grant Agriculture and Renewable Resources Universities (NARRU) in the United States.

What to Expect: This research study is administered online. Participation in this research will involve completion of a questionnaire. You will only be expected to complete the questionnaire once and no follow-up contact will be made upon completion of the questionnaire. The questionnaire is comprised of questions related to perceptions about student farms, management of student farms, and current teaching/research/outreach practices at your university. Question formats include multiple choice, yes/no, fill in the blank, and short answer. It should take approximately 10 minutes to complete and can be completed in one sitting.

Risks: There are no risks associated with this project which are expected to be greater than those ordinarily encountered in daily life.

Benefits: Upon completion of this survey, you may request a copy of the final results and conclusions as a benefit for your participation. The results of this study have great benefits for LGUs and NARRUs in helping to advance our understanding of student farms as a tool for accomplishing the mission of teaching, research, and outreach on relevant agricultural topics.

Compensation: There is no compensation associated with this study.

Your Rights and Confidentiality: Your participation in this research is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this project at any time.

Confidentiality: The records of this study will be kept private. The name of your university will only be used to create a map and list of universities with and without student farms. This map and list may be published in the future; however, no university names will be linked to the other survey responses or your name in any way. Any published results will discuss group findings and will not include information that will identify you or your university. Research records will be stored on a password protected computer and only researchers and individuals responsible for research oversight will have access to the records. The data will be downloaded and deleted from the Qualtrics website by June 1, 2018. The data will be unlinked from the university name once the list and map have been created no later than March 15, 2018. All data will be retained by the investigators, but will not be linked to the individual who completed the survey or their university.

Contacts: You may contact the following researchers at the email addresses and phone numbers provided, should you desire to discuss your participation in the study and/or request information about the results:

Matthew Barton, B.S.	**Justin Q. Moss, Ph.D.**
matthew.barton@okstate.edu	mossjq@okstate.edu
256-390-7020	405-744-5729

If you still have questions about your rights as a research volunteer, you may contact the IRB Office at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377, or irb@okstate.edu

Participation: Please, click the arrow below if you choose to participate. By clicking the arrow below, you are indicating that you freely and voluntarily agree to participate in this study, and you also acknowledge that you are at least 18 years of age.

It is recommended that you save a copy of this consent page for your records before you begin the study. Click the file below to download this consent form.

VITA

Matthew Paul Barton

Candidate for the Degree of

Master of Science

Thesis: PREVALENCE, USE, AND PERCEPTIONS OF STUDENT FARMS AT PUBLIC AGRICULTURAL UNIVERSITIES

Major Field: Horticulture

Biographical:

Education:

Completed the requirements for the Master of Science in Horticulture at Oklahoma State University, Stillwater, Oklahoma in May 2018.

Completed the requirements for the Bachelor of Science in Agricultural Sciences and Natural Resources at Oklahoma State University, Stillwater, Oklahoma in May 2010.

Experience:

Oklahoma State University — Stillwater, Oklahoma
Department of Horticulture & Landscape Architecture
Graduate Teaching Assistant
Graduate Research Assistant

Multiply National Investments, LLC — Seeb, Sultanate of Oman
Urban Oasis Garden Systems
Associate Director

Montevallo High School — Montevallo, Alabama
Agriscience Teacher/FFA Advisor